

canceled. It is submitted that the present application is in condition for allowance for the following reasons.

In section 1 of the Detailed Action, the examiner noted applicant's previous restriction and election, and that independent claims 1, 24 and 44 were linking claims. By this Amendment, the other two independent claims and the claims dependent therefrom (i.e., claims 27-41) have been canceled to prepare this application for allowance.

In section 2, claims 1, 2, 9-12, and 18 were rejected under 35 USC § 112 for being indefinite. By this Amendment, claims 1, 11 and 12 have been suitably amended to overcome the noted problems in a self-evident manner. In addition, other minor corrections have been made to other dependent claims as shown; including the deletion of an optional recitation from claim 16 which has now been recited in new claim 47. In view of the changes to the claims, it is submitted that all pending claims are now definite.

In section 4, independent claims 1 and 24 together with the noted claims dependent therefrom were rejected under 35 USC § 102 as being anticipated by Kuhn *et al.* However, for the following reasons, it is submitted that these claims are allowable over this reference.

Firstly, Kuhn *et al.* teach the use of a polychromatic light source for determining quickly and accurately the surface profile of a sample. The polychromatic nature of the light source is fundamental to the invention of Kuhn *et al.*, as the disclosed method focuses this polychromatic light at different distances according to wavelength so that

the nature of the return spectrum provides a measure of the distance to the target and hence surface profile.

The present invention, on the other hand, employs coherent light whose coherence, as the those of ordinary skill in the art will appreciate, could not be maintained if that light were polychromatic. The coherence of the light employed in the present application is no arbitrary choice. As defined in claims 1 and 24 and claims depending therefrom, the apparatus and method of the present invention deviate or displace light returning from the sample by a small angle or distance relative to the incident beam, principally so that the system can be employed in confocal systems requiring—as in endoscopy—compact optical heads. Indeed, the present invention as defined in these claims is limited to a confocal system.

These two limitations (i.e., confocality and small beam deviation) cannot be provided by the method or apparatus of Kuhn *et al.* Light from a polychromatic source will be deviated by varying extents when passing through the various optical elements. Consequently, the apparatus of Kuhn *et al.* will not produce return light that is deviated or displaced by a small angle or distance, because the various components of the returning beam (produced by the polychromatic incident beam) will be deviated or displaced by varying amounts depending on their wavelength. There is no disclosure in Kuhn *et al.* of, for example, optical elements provided to ensure that all return light will follow essentially the same path so that all of that light is constrained to be similarly deviated or displaced. The Examiner's attention is directed to Figure 2B (illustrating the first embodiment), in which dispersed beams 72 and 74 are directed to different portions

of detectors 48 (see column 6, lines 2 to 4): even if one of these beams were said to be deviated or displaced by a small angle or distance, clearly the other is not.

Secondly, however, Kuhn *et al.* does not teach a system wherein returning light is deviated or displaced by a *small* angle or distance. The Examiner refers to beam splitter 152 (see Figure 4) and observes that "light returning from the sample is deviated or displaced by the beam splitter relative to the incident beam". However, there is no disclosure in Kuhn *et al.* of the deviation or displacement of the returning light relative to the incident light by a small angle or distance. Beam splitter 152 can be regarded either as deviating the light by 90° or as displacing each individual beam of light by the entire diameter of lens 112 relative to the incident beam. Whichever description is adopted, this arrangement does not meet the limitation of the claims of the present application whereby the returning light is deviated or displaced by a small angle or distance relative to the incident beam.

Fundamentally, therefore, the apparatus of Kuhn *et al.* cannot be employed in the manner defined in the rejected claims and, consequently, it is submitted that independent apparatus claim 1 and dependent claims 2, 9 to 12 and 18 (and hence all of dependent claims 2-23, 41-42 and 47) are novel and inventive over the cited prior art document. For these same reasons, it is submitted that independent method claim 24 (and dependent claims 25-26) is similarly allowable.

In section 6, independent claim 44 was rejected under 35 USC § 103 as being unpatentable over Kuhn *et al.* In claim 44, it is claimed that coherent light is used, and that a broader beam of returning light is induced with a portion thereof adjacent to or near the incident beam being detected. As noted above, Kuhn *et al.* does not disclose

either of these features. Therefore, independent claim 44 (and dependent claims 45-46) is inventive over this reference as well.

The remaining references which were cited but not applied have been reviewed but are not believed to be pertinent to the patentability of the present invention.

For all of the foregoing reasons, it is submitted that the present application is in condition for allowance and such action is solicited.

Respectfully submitted,

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ATTACHMENT B

Marked Up Replacement Claims

Following herewith is a marked up copy of each rewritten claim together with all other pending claims.

1. (amended) A confocal endoscope or microscope including:
a light source of coherent light for illuminating a sample;
a beam splitter; and
light receiving means, (1) wherein an incident beam of light from said light source is directed onto said beam splitter and hence onto said sample, and (2) wherein light returning from said sample and incident on said beam splitter is deviated or displaced by said beam splitter by a small angle or distance relative to said incident beam, and is then received by said light receiving means, said light receiving means being located to receive said returning light and near said light source.
2. A confocal endoscope or microscope as claimed in claim 1, including an optical head and said light source is located in or on said head.
3. A confocal endoscope or microscope as claimed in claim 2, including heating means for maintaining said head at a temperature substantially equal to that of said sample.
4. A confocal endoscope or microscope as claimed in claim 1, wherein said light source and said light receiving means are on a single mounting means.
5. A confocal endoscope or microscope as claimed in claim 4, wherein said beam splitter is mounted on said mounting means.
6. A confocal endoscope or microscope as claimed in claim 4, wherein said mounting means is moveable for scanning said light source.

7. A confocal endoscope or microscope as claimed in claim 4, wherein said mounting means includes a reed.
8. (amended) A confocal endoscope or microscope as claimed in claim 4, wherein said mounting means is an electromagnetically vibrated reed.
9. A confocal endoscope or microscope as claimed in claim 1, wherein said light source and said light receiving means are adjacent or touching.
10. (amended) A confocal endoscope or microscope as claimed in claim 1, wherein said light source is an optical ~~fiber~~fiber tip.
11. (amended) A confocal endoscope or microscope as claimed in claim 1, wherein said beam splitter includes a plurality of optical elements selected from prisms, and/or lenses, or both prisms and lenses.
12. (amended) A confocal endoscope or microscope as claimed in claim 11, wherein said plurality of optical elements~~prisms and/or lenses~~ provide ~~minimal~~ net deviation or translation, so that said coherent light ~~or and said light reflected~~ returning from said sample respectively emerges from said plurality of optical elements~~prisms and/or lenses~~ substantially parallel to and optically coaxial with ~~its~~ it's a respective path immediately before impinging said plurality of optical elements~~prisms and/or lenses~~.
13. (amended) A confocal endoscope or microscope as claimed in claim 11, wherein said plurality of optical elements~~prisms and/or lenses~~ is arranged to focus confocal return stokes fluorescence to form a line, said line forming a spectrum in which shorter wavelength fluorescence is located towards a first end of said line closer to said light source, while longer wavelength fluorescence is located towards a second end further from said light source.

14. A confocal endoscope or microscope as claimed in claim 1, including means to allow light on either side of a spectral line in said returning light to be included with light from said spectral line when said returning light impinges on said light receiving means.

15. A confocal endoscope or microscope as claimed in claim 14, wherein said means is controlled by a mechanism which occludes light which is more distant in wavelength than a desired amount from said spectral line, to allow control of depth of field isolation.

16. (amended) A confocal endoscope or microscope as claimed in claim 14, including optical elements to divert chosen wavelength portions of said spectral line, ~~and optionally light close in wavelength to said spectral line,~~ to one or more photodetectors to give different spectral channels for imaging.

17. A confocal endoscope or microscope as claimed in claim 1, including at least one optical waveguide channel to convey said returning light to said photodetectors.

18. A confocal endoscope or microscope as claimed in claim 1, including a laser and an optical waveguide to convey light from said laser to said light source.

19. A confocal endoscope or microscope as claimed in claim 1, including a first optic waveguide to convey light to said specimen and at least one second optic waveguide channel to convey said returning light to said photodetectors, and said beam splitter is disposed in said head between said first and second optic waveguides.

20. (amended) A confocal endoscope or microscope as claimed in claim 1, including a return ~~fiber~~fiber and wherein said beam splitter is located between a light exit area of said return ~~fiber~~fiber and said photodetectors, to provide spectral separation after said returning light exits said ~~fiber~~fiber.

21. A confocal endoscope or microscope as claimed in claim 1, including an aperture slit moveable in front of said photodetectors simultaneously with said scanning to compensate for changes in beam splitter deviation.

22. A confocal endoscope or microscope as claimed in claim 11, wherein said plurality of prisms and/or lenses include at least one apochromatic lens.

23. A confocal endoscope or microscope as claimed in claim 11, wherein said prisms and/or lenses include an SF 11 or SF 59 prism.

24. (amended) A method for performing confocal endoscopy or microscopy including the steps of:

illuminating a sample by means of an incident or excitatory beam of coherent light; and

deviating or displacing light returning from said sample by a small angle or distance relative to said incident beam.

25. A method as claimed in claim 24, including receiving or detecting said returning light at a point close to a source of said incident or excitatory beam.

26. A method as claimed in claim 24, wherein said deviating or displacing of said light returning from said sample is effected by means of a beam splitter.

42. A confocal endoscope or microscope as claimed in claim 1, wherein said light source comprises a mirror located in the path of the returning light for directing light towards said sample, wherein said mirror has a smaller solid angle than said returning light to only partially occlude reception of said returning light by said light receiving means.

43. A confocal endoscope or microscope as claimed in claim 42, wherein said mirror and said light source are provided on a single piece of silicon and said mirror comprises an etched mirror surface of the silicon.

44. (amended) A method for performing confocal endoscopy or microscopy including the steps of:

illuminating a sample by means of an incident or excitatory beam of coherent light and thereby inducing a broader beam of returning light; and

detecting a portion of said returning light adjacent to or near said incident beam.

45. A method as claimed in claim 44, including directing said incident light towards said sample by means of a mirror located in the path of said returning light, wherein said mirror has a smaller solid angle than said returning light to only partially occlude reception of said returning light.

46. A method as claimed in claim 45, wherein said mirror and the source of said incident light are provided on a single piece of silicon and said mirror comprises an etched mirror surface of the silicon.

47. (new) A confocal endoscope or microscope as claimed in claim 16, wherein the optical elements also divert light close in wavelength to said spectral line.